

ASSESSMENT OF THE HEALTH BENEFITS OF THE IMPROVEMENT OF WATER SUPPLY AND SANITATION SERVICES IN TANGIER (2004-2009)

Lucie Lambolez, *Veolia Environnement Research & Innovation, Rueil-Malmaison, France*

Hélène Morin, *Veolia Environnement Research & Innovation, Rueil-Malmaison, France*

Catherine Arfi, *Consultant in environmental and occupational Health, Issy Les Moulineaux, France*

Bruno Detournay, *Cemka-Eval, Bourg-la-Reine, France*

Abdenbi Attou, *Veolia Water Morocco, Tangier, Morocco*

Mahmoud Berrahal, *Veolia Water Morocco, Tangier, Morocco*

Background and Aims Access to water and sanitation are major issues of Public Health. A very large works program to improve drinking water supply and sanitation was conducted since 2002 in the metropolitan Tangier (750,000 inhabitants) in Morocco. To assess the benefit of the works on the population health, an epidemiological study with a pre-post methodology was achieved between 2004 and 2009.

Methods An epidemiological register was implemented in 17 health facilities in order to follow the incidence of three water-related diseases: diarrhoea in children under 5, conjunctivitis and skin diseases in the overall population. At the same time, surveys were conducted in two-pilot districts which had no water supply other than wells/fountains nor wastewater systems, at the beginning of the study. Twice-yearly, 70 households (≈400 people) were questioned to qualify water use, hygiene practices, health outcomes (diarrhoea, conjunctivitis, skin diseases). Samples of the water they consumed were collected for microbiological analysis. Works progress and sea water quality were assessed during the five-year period (WHO/UNICEF 2008 Esrey 1985, Esrey 1986, Esrey 1991, Fewtrell 2005).

Results In the pilot districts, the incidence of diarrhoea in children (-20%) and conjunctivitis (-34%) decreased in parallel with the improvement of the quality of the water consumed by households (correlated with improved access to drinking water and the reduction of storage practices). On the macroscopic scale of the city, the health indicators remain stable. Different non controlled parameters may explain this result. With the improvement of sanitation at the Tangier level, the quality of sea water in summer was significantly improved and since 2007 all beaches meet the Moroccan standards, for the indicators followed.

Conclusions The originality of the project relies on its two-scale approach and its size: a 5-year health monitoring of the population of a large city on the Mediterranean coast. Results interpretation faces difficulties in estimating the population growth Tangier. An individualized monitoring methodology permits to exclude some confounding factors.

References: WHO/UNICEF(2008) Joint Monitoring Programme for Water Supply and Sanitation. Progress on Drinking-water and Sanitation: special focus on sanitation. UNICEF, New York and WHO, Geneva, 2008

Esrey SA(1985). Interventions for the control of diarrhoeal diseases among young children: improving water supplies and excreta disposal facilities. *Bull World Health Organ*; 63: 757–72.

Esrey SA(1986). Epidemiologic evidence for health benefits from improved water and sanitation in developing countries. *Epidemiol Rev* 1986; 8: 117–28.

Esrey SA (1991). Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma. *Bull World Health Organ*; 69: 609–21.

Fewtrell, L.(2005). Water, sanitation and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. *Lancet Infectious Diseases* ; 5: 42-52